* teacher blog should be helpful *

Lenses 4/23/15

Types of Lenses:

Converging

Diverging

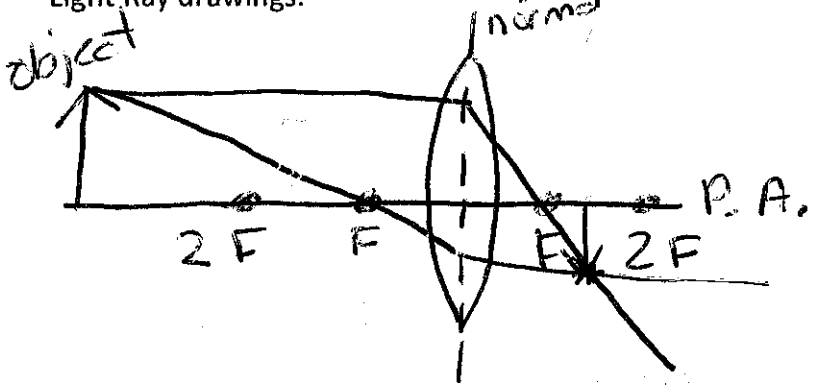
Convex

thicker at center than edges refract light

Concave

thin in middle, thick edges rays spread out

Light Ray drawings:



F = Focal point

2F = 2nd Focal point

Ray Diagram for Converging lens:

Step 1: Draw a line parallel to the axis to the lens. Extend the line through the Focal point. on the other side of the lens.

Step 2: Draw a line through the focal point to the lens. Extend the line parallel to the axis on the other side of the lens.

Step 3: The point of intersection is the top of the refracted image. Draw an arrow from the axis intersection to the intersection.

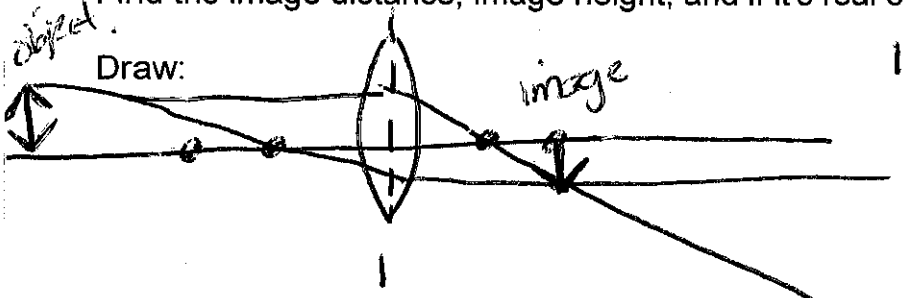
Draw:

The Mirror/lens equation : $\frac{1}{f} = \frac{1}{di} + \frac{1}{do}$ still works for lenses.

The Magnification equation: $\frac{hi}{ho} = \frac{di}{do}$ still works for lenses.

Example:
A 3cm high object is placed 32 cm from a convex lens that has a focal length of 8 cm.
Find the image distance, image height, and if it's real or virtual.

Draw:



inverted so it is real

$H_o = 3$ cm
$D_o = 32$ cm
$F = 8$ cm

Formula to find image distance: $\frac{1}{8} = \frac{1}{di} + \frac{1}{32}$ Di

Plug in numbers:

$\frac{1}{8} = \frac{1}{di} + \frac{1}{32}$ $\frac{1}{8} = .125$ $\frac{1}{32} = .03125$

convert to decimals.

$.125 = \frac{1}{di} + .03125$ $.0125 - .01325 = 1/di$

Answer: $di \cdot \frac{1}{di} = .09375 \times di$ $di \cdot \frac{.09375}{.09375} = \frac{1}{.09375}$

$D_i = 10.67$

Formula to find image height: $\frac{hi}{ho} = \frac{di}{do}$

Plug in numbers:

$\frac{hi}{3} = \frac{-10.67}{32}$

* negative because it is inverted. so it is real *

$3 \cdot \frac{hi}{3} = -.333 \cdot 3$

Answer: $h_i = -1.0$ cm

Real or Virtual? real